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Гуманитаризация технического университетского образования: эффективные стратегии и практики

Последние изменения системы образования предъявляют определенные требования к подготовке студентов технических направлений подготовки/специальностей с учетом индивидуально – личностных особенностей, социальных заказов регионов, страны, а также международных интеграционных процессов. В связи с такими тенденциями гуманитаризация технического образования может приобрести многоаспектный, прогностический характер. Статья нацелена на выявление и анализ доминирующих стратегий гуманитаризации высшего образования студентов технической направленности через призму универсальных компетенций.

Для анализа стратегий гуманитаризации высшего образования студентов технической направленности была применена совокупность методов: метод case-study, объект – Уральский федеральный университет (Екатеринбург, Россия); метод получения и анализа первичных и вторичных данных. На основе системного и структурно-функционального подходов рассмотрены не только стратегии, но и такие формы их реализации, как целенаправленные усилия (в учебной деятельности) и стихийные практики (во внеучебной деятельности).

Результаты исследования: установлено соотношение компетенций «4К», группы универсальных компетенций и универсальных компетенций в соответствии с Федеральными государственными образовательными стандартами высшего образования (версия 3++); с учетом данных Атласа новых профессий выявлена связь группы компетенций «4К» с надпрофессиональными навыками, необходимыми в профессиях технических отраслей; определены эффективные стратегии и практики, в числе которых обязательное «ядро» бакалавриата для технических направлений подготовки из гуманитарных дисциплин; обоснована роль Центра развития универсальных компетенций как университетской структурной единицы по продвижению майноров гуманитарной направленности; выявлен ресурс института наставничества и кураторства, студенческих научных, общественных, творческих объединений в формировании гуманитарной среды университета.

Ключевые слова: стратегии гуманитаризации образования, гуманитарная среда, формула «4К», универсальные компетенции, майноры, гуманитарное «ядро» бакалавриата, целенаправленные усилия, стихийная практика

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Humanitarization of technical university education: effective strategies and practices

Last changes in the education system impose certain requirements for the training of technical specialties students, taking into account individual – personal characteristics, social orders of regions, countries, as well as international integration processes. Due to such trends, the humanitarization of technical education can become multidimensional and predictive. The article is aimed at identifying and analyzing the dominant strategies for the humanitarization of higher education of technical students through the prism of universal competencies.

The set of methods was used to the analysis of the humanitarization's strategies of higher education of technical students: the case-study method, the object – Ural Federal University (Ekaterinburg, Russia); method for obtaining and analyzing primary and secondary data. Based on the system and structural-functional approaches, not only strategies are considered, but also such forms of their implementation as purposeful efforts (in educational activities) and spontaneous practices (in extracurricular activities).

Research results: the ratio of "4 C's" competencies, the group of universal competencies and universal competencies in accordance with the Federal State Educational Standard for Higher Education (version 3+ +) is found; taking into account the data from the Atlas of new professions, the connection of the competence group "4 C's" with soft skills required in the professions of technical industries is revealed; effective strategies and practices are identified, including the mandatory bachelor's degree "core" of humanities studies for technical specialties; the role of the center for the universal competencies development as a university structural unit for the promotion of humanitarian minors is justified; the resource of the institute of mentoring and supervision, student scientific, social, and creative associations in the formation of the humanitarian environment of the university is revealed.

Keywords: strategies for the humanitarization of education, the humanitarian environment, "4C's" formula, universal competencies, minors, bachelor's degree humanitarian "core", purposeful efforts, spontaneous practice

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Introduction

The implementation of new standards in higher education (we are talking about the FSES 3++) is aimed at maximum integration of education and the labor market, coordination of the list of formed competencies among university graduates of technical specialties with the requirements of employers, contained in the generalized labor functions of professional standards. We should pay attention to the fact that the new educational standards are aimed at rethinking the competencies that a student/graduate should have.

The well – known formula for the basic competencies of a modern specialist «4 C's» – Communication, Creativity, Critical Thinking, Coordinating With Others – aims to bridge the gap in the university graduates' training between the knowledge obtained at the university and the skills expected by employers. Researchers and employers think that these competencies are the most important for modern society. This is reflected in the Federal State Educational Standards for Higher Education (hereinafter – FSES HE, version 3++) of all bachelor's and master's degree specialties (table 1).

Table 1

Correlation of "4 C's" competencies with groups of universal competencies and universal competencies (according to FSES HE 3++)

"4 C's" formula competencies	Name of the category (group) of universal competencies	Code and name of the universal competence of the program graduate
Bachelor's degree		
Critical thinking	System and critical thinking	UC-1. Able to search, critically analyze and synthesize information, apply a system approach to solving assigned tasks
Creativity	Project development and implementation	UC-2. Able to determine the range of tasks within the set goal and choose the optimal ways to solve them, based on current legal norms, available resources, and restrictions
Communication	Communication	UC-4. Able to conduct business communication in oral and written forms in the state language of the Russian Federation and foreign language(s)
	Intercultural interaction	UC-5. Able to perceive the intercultural diversity of society in socio-historical, ethical, and philosophical contexts
Teamwork	Teamwork and leadership	UC-3. Able to carry out social interaction and realize his role in the team
	Self-organization and self-development	UC-6. Able to manage their time, build and implement a trajectory of self-development based on the principles of education throughout life
Master's degree		
Critical thinking	System and critical thinking	UC-1. Able to perform critical analysis of problem situations based on a system approach, develop an action strategy
Creativity	Project development and implementation	UC-2. Able to manage the project at all stages of its development
Communication	Communication	UC-4. Able to apply modern communication technologies, including in a foreign language(s), for academic and professional interaction
	Intercultural interaction	UC-5. Able to analyze and take into account the diversity of cultures in the process of intercultural interaction
Teamwork	Teamwork and leadership	UC-3. Able to organize and manage the team's work, developing a team strategy to achieve the goal
	Self-organization and self-development	UC-6. Able to identify and implement priorities of his own activities and ways to improve them based on self-assessment

In management and personnel management, ideas about what a university graduate should be like have changed. The concept of "lifetime employment" has been replaced by the concept of "protean career" or "boundaryless career" [1]. Management theories justify that a modern employee needs a change of workplace and functionality. Therefore, in addition to horizontal mobility, vertical mobility should also be mentioned in the employee career management system in the company. There is a transformation of employee values, young professionals are focused on their own achievements, improving the quality of life, their social and economic situation. It should be noted that among employees there are those who are focused on postmodern values, the search for meaning is not in material well-being and consumerism, but in expanding relations with society, involvement in solving problems significant for society (charity, participation in communities, etc.) [2]. This is evidenced by the results of a public opinion survey on the problem "Corporate volunteering: from theory to practice" (March 2018), conducted by VCIOM [3]. Thus, 15% of Russians participated in corporate volunteering, when employees' gratis activities to support socially vulnerable groups of people were supported by the company-employer. At the same time, according to VCIOM, the indicator of involvement in corporate volunteering is higher in cities with a population of more than a million, it is 21% [3]. It can be noted that a modern employee should have not only highly specialized knowledge, but also management and communication skills, which is less provided for by university educational programs of technical specialties [4]. All this makes it possible to speak about the relevance of the problem of technical education's humanitarization, the need to include the resource of humanitarian disciplines in the practice of teaching students of technical specialties [5]. Humanitarization of technical education should become the norm and daily practice of the educational and extracurricular process of a modern university.

In our research, the higher education system is considered in the context of training graduates of technical specialties, taking into account the needs of the modern labor market. On this basis, methodological, pedagogical strategies and concepts are identified, determining the educational process of a modern university as aimed at mastering humanitarian thinking and culture by students of technical specialties.

Research objectives are related to the study and analysis of the case – "Strategies and practices for implementing the humanitarization of technical education" on the example of the Ural Federal University named after the first President of Russia B. N. Yeltsin (hereinafter – UrFU). The choice of the university is not accidental: the university is in the TOP-500 in the QS world university ranking, and in 2020 it is at the 364th position [6]. Positive progress in the QS rating is associated with the university's development strategy in educational, scientific, and innovative activities, developed in accordance with global trends and current tendencies in education and science. Thus, the university's educational strategy provided for the development of SEES – Self-established educational standards, which are currently being successfully implemented; a list of universal disciplines for the "core" of the bachelor's degree in all areas of training, including technical ones, is defined. In addition, the module (discipline) "minor" was included in all bachelor's degree programs, giving the student the opportunity to get additional competencies in fields of knowledge other than the main direction of preparation of his educational program. Minors, as an integral part of not only bachelor's degree programs in general, but also individual educational trajectories, are aimed at forming competencies significant in achieving career ambitions. The "Minor" module of technical specialties includes the following disciplines: "Startup management", "Generating Ideas and Decision Making", "Business efficiency", "Business communications

in the modern world", "Art of public speaking", "Personal effectiveness", "Reveal brain resources", "Creating and promoting a blog", "Stress management" and many others.

We consider the inclusion of students of technical specialties in the mastering of the humanities block's disciplines as a significant resource in solving the problem of humanitarization of technical education and a condition for the formation of students' competencies required by the employer.

Materials and methods

The methodology of studying the problem of humanitarization of university technical education is based on the system and structural-functional approaches. During the study, the method of obtaining primary and secondary data was applied. The basis for obtaining and analyzing primary data is the case-study method. The object of this research was UrFU as university, which is included in the TOP-500 in the world ranking of QS universities. Scientific search and processing of publicly available information through the Internet was carried out to obtain secondary data. The set of research methods made it possible to build a theoretical concept of humanitarization of university technical education and illustrate it with examples.

Literature review

Education and training in higher education are inextricably related to humanization and humanitarization, recognition of the importance of each student's individuality and the mastery of humanitarian culture and thinking [7]. Humanitarization of technical specialties students is defined by the concepts of "humanitarian orientation of education", "humanitarian culture", "humanitarian environment", "humanitarian thinking" [8]. It should be noted that the position of antagonism of "techies-humanities" is supported by the educational system itself. At the same time, the "techies" are often positioned as more significant than the "humanities", which is also the case in higher education (for example, in the distribution of budget places). Another example: in the "Program for stimulating talented first-year students of UrFU in the 2020–2021 academic year", an increased scholarship is provided for high-point students (high USE scores), while for students of technical specialties, payments are provided from 265 points, and for students of humanities – from 280 points [9].

The problem of humanitarization of education is related to the determination of its strategic guidelines. Strategies of humanitarization in higher education should be connected, first of all, with socio-cultural changes, the transition to subjective, personalized types of activities [10]. In addition to substantive knowledge, it is important for a specialist to possess competencies suitable for a specific socio-cultural situation with the characteristic properties of uncertainty and variability, when reproductively mastered behavioral practices do not work. This necessarily requires orientation in technical education to new strategies related to rethinking approaches to the content and methods of training specialists.

According to N. S. Rozov, the strategy of education's humanitarization should be defined taking into account the subject-professional and value-content aspects, based on the system of universal values, actualization of the need and ability for free and responsible choice, self-actualization of the individual in culture and profession [11]. This approach aims

at the fact that technical education should be personality-oriented, that is, it should be aimed at personal and professional development, self-determination, self-affirmation of students through building subject-subject interactions in the educational process, designing humanitarian-oriented content of training programs and ways of their implementation, as well as actualizing the humanitarian potential of disciplines [12].

Note that the extensive strategy of technical education's humanitarization focuses on the construction of the disciplines' content through filling them with humanistic norms and ideals, and intensive – on the design of ways to expand educational content, variable construction of the educational process [13].

During the study, we have identified two strategies for humanitarization of technical education that are dominant in UrFU: the first is a strategy for expanding the opportunities of the profession through the development of humanitarian competencies; the second is the strategy of students' self-realization in activities. Humanitarization as an extension of the profession involves considering the socio cultural context in the implementation of professional activities; consideration of professional problems from a humanistic perspective; assimilation of socially significant values in the development of professional culture (ideological component) and the connection of technological decisions with environmental consequences, creative activities; formation of critical thinking and ability to make independent decisions in the implementation of professional objectives. This strategy assumes that humanitarization becomes an additional element for expanding the profession. This can be expressed in the establishment of humanitarian disciplines, in giving professional disciplines, taking into account the socio-cultural context [14], humanistic positions to expand professional culture and professional competencies [15]. Thus, humanitarization in the context of expanding the profession serves as a tool for the professional education development [16; 17].

The strategy of humanitarization as self-realization in activity involves self-actualization in professional, social, and creative activities; self-realization with recognition of the right to freedom, development, disclosure of talent in/out of professional activity; accepting the ethics of humanism; cultural integration, tolerance and cooperation; free-thinking, a culture of thoughts' expression; communicative competence. The expected results of humanitarization of technical education are related to the mastery of students' humanitarian culture, understood as the ability to comprehend socially significant values, take them into account in professional activities, build intercultural communications using soft skills (first strategy). The second strategy considers the process of humanitarization as self-realization in activity. This leads to more attention to the student's personality, his self-actualization, potential disclosure. This strategy is aimed at forming the ethics of humanism, humanitarian culture and thinking. This concept is based on the concept of personal autonomy, which implies independence in choosing the motives of actions and individual trajectory, taking into account the university's infrastructure and the opportunities of educational / extracurricular activities [18]. Thus, this strategy is aimed at forming students' subjectivity, responsibility for the taken and implemented action, and understanding the importance of participation in the society's life [8].

Obviously, these humanization strategies take place in university technical education. The problem of their development and effectiveness in a particular university, the influence on the formation of competencies required by the employer in relation to graduates of technical specialties, is the main issue of our research.

Research results and discussion

Humanitarianization of university technical education as a process of acquiring socially significant personality traits presupposes the formation of an integral, comprehensively developed personality, ready for changes in the modern labor market in conditions of high labor mobility, digitalization, entry into the world labor market, internationalization of communications in the professional environment. The 2020 Atlas of New Professions accumulates the professions of the future in 27 industries from the fashion industry to aviation, soft skills are prescribed, correlated with the professions of the future [19]. Figure 1 shows the soft skills from the Atlas of New Professions (version 3.0).

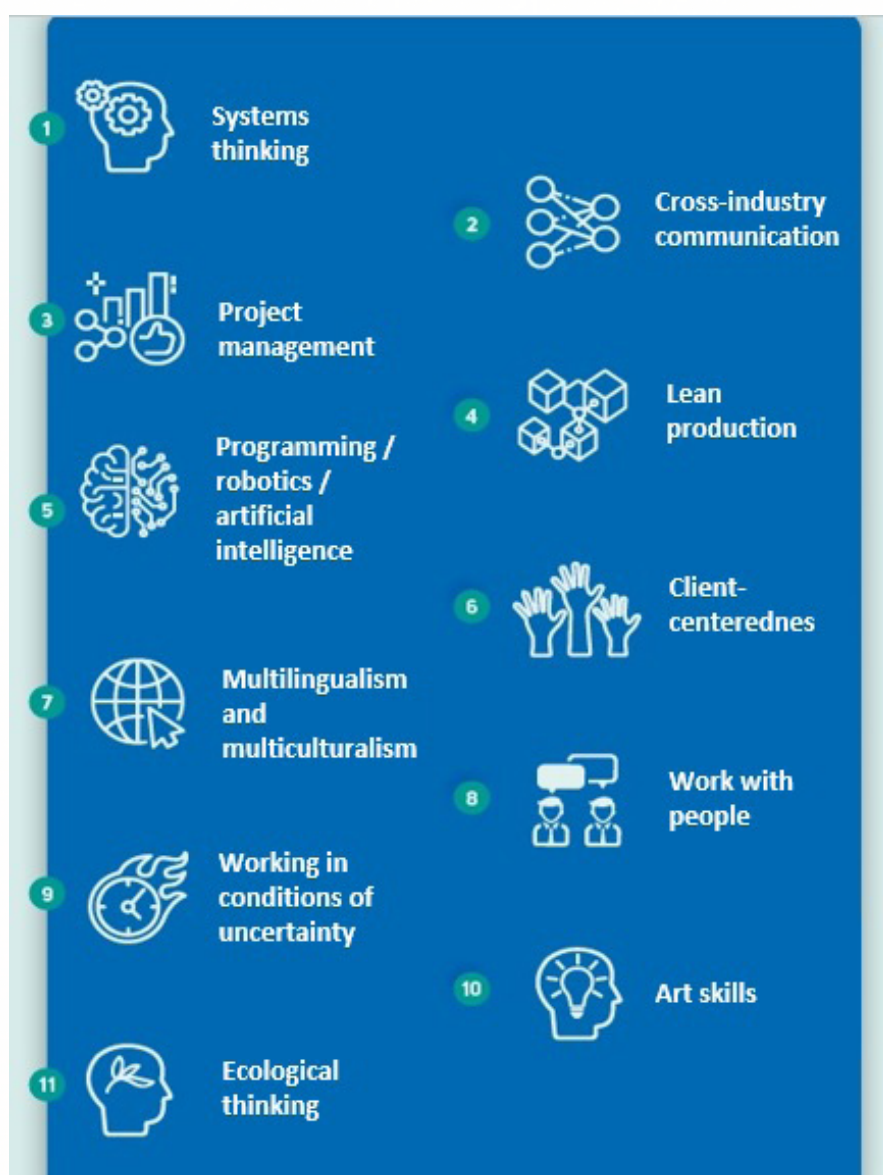


Figure 1 Soft skills (based on the Atlas of New Professions)

Based on the data of the Atlas of new professions, we have determined the ratio of the "4 C's" competence group with the soft skills required in the professions of the future using the example of the "ground transport" and "electric power" industries (table 2).

Table 2**The ratio of "4 C's" competencies and soft skills**

"4 C's" formula competencies	Soft skills	Profession of the future (industry)		
		Transport network security engineer (ground transport)	Cross-logistics operator (ground transport)	Electricity Consumer Rights Defender (electric power industry)
Critical thinking	Systems thinking	+	+	+
Creativity	Working in conditions of uncertainty	+	+	+
Communication	Multilingualism and multiculturalism	+	+	+
	Cross-industry communication	+	+	+
Teamwork	Work with people Project management	+	+	+

A modern university stimulates the development of professional and general cultural competencies, humanitarian culture and thinking among students of technical specialties through their inclusion not only in academic but also in extracurricular activities. So, as a motivational component, universities consider scholarship payments, which take into account not only academic performance, but also participation in socially significant events, involvement in volunteer activities, and others. Thus, the humanitarization of technical specialties is an important strategic step.

During the study of the UrFU case, we identified such forms of implementing the strategy of humanitarization of technical specialties as purposeful efforts and spontaneous practices. The comparison criteria were goals, methods, audience, and method of monitoring the realization of goals. If we consider purposeful efforts (in educational activities), then the goal is the development of humanitarian culture and humanitarian thinking among all students, which we consider as a necessary condition for the development of high professional mobility. The study identified methods for achieving this goal, including the study of humanities; pedagogical skills of scientific and pedagogical personnel; the use of modern pedagogical technologies in the study of technical disciplines (active search forms, problem lectures, round tables, business and situational games, etc.) to form a set of competencies among students of technical specialties; taking into account the socio-cultural context of professional activity. Control over the implementation of the goal is carried out by enshrining it in regulations, which is a guarantee of achievement.

Spontaneous practices (in extracurricular activities) are aimed at forming students' self-organization skills, teamwork, project activities, soft skills, social and psychological adequacy (stress resistance) on the basis of their independent and voluntary choice. The achievement of goals is ensured by the combined efforts of curators, mentors, the activities of the university students' union, a developed network of scientific and creative associations, discussion clubs, a system of educational, cultural and sports events, volunteer activities. Variability, voluntariness, independence, freedom of choice are the conditions for achieving the goals of humanitarization in the implementation of spontaneous practices in extracurricular activities.

A comparison of the two forms of implementation of the university strategy for technical specialties' humanitarization – purposeful efforts and spontaneous practices, allows us to

conclude the following: in the first case, the focus is on the policy of creating conditions for the humanitarian culture development for all students of technical specialties, updating the existing opportunities for the formation of general cultural competencies; in the second case, the focus is on technologies, methods of students' socialization, their involvement in the process of intercultural communication with teachers, mentors, foreign students and all other members of the university community. When the process of forming competencies is not directly related to the development of theoretical and practical blocks of technical specialties.

Let us consider some of the inherent tools for implementing the strategy of humanitarization of technical education using the example of a multidisciplinary university, such as UrFU. In 2020, the admission campaign included recruitment in the following areas of study: engineering – 61, information technology – 19, natural sciences and mathematics – 16, which accounted for 61% of the total admission (figure 2). As we can see, the university has a clear predominance of technical specialties, but there is a sufficient basis for implementing the strategy of humanitarization through the use of the potential of specialties in the blocks "Socio-humanitarian sciences and technologies", "Economics and management" (figure 2).

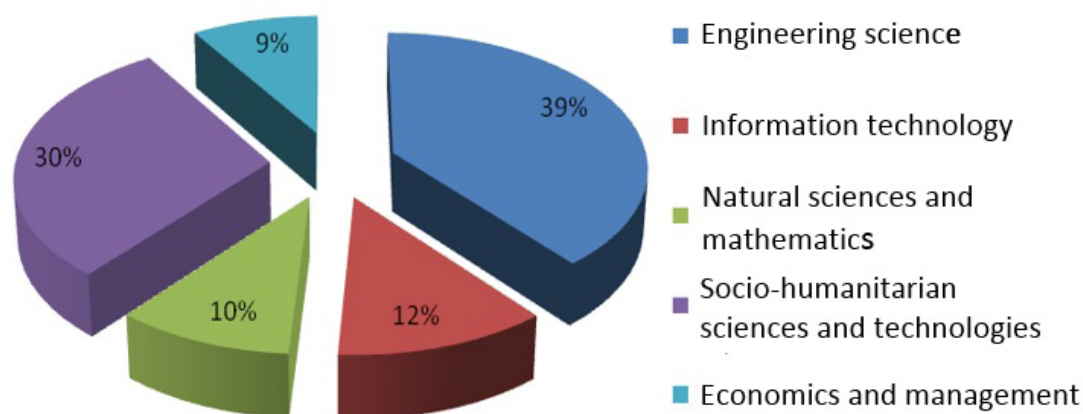


Figure 2 Orientation of training of UrFU students (training levels – bachelor's degree, specialist programme) within the admissions campaign 2020

Let us consider the university's purposeful efforts in implementing the strategy of humanitarization of the university's technical specialties. One of the most important tools for the humanitarization of technical education is the introduction of humanities in the curricula of all technical specialties. The university has developed a list of mandatory bachelor's core disciplines for technical specialties (table 3).

Researchers emphasize that due to the specifics of humanitarian knowledge, its multiparadigmality, variety of interpretations, and the initiation of new topics and discussions by the social development itself [20], students develop critical thinking. This is important for students of technical specialties, who, as a rule, follow strict rules and calculations when studying the disciplines of the professional block [21]. The study of the 2020–2021 academic year curriculum confirmed that the training of engineering students includes such sections as: effective communication practices (3 c.u.), the basics of foreign language professional communication (on average – 288 hours); ideological foundations of professional activity (3 c.u. – history, philosophy), the basics of humanitarian culture (2–3 c.u. on disciplines – law, the legal basis of professional activity, psychology, economics of the professional activity industry).

Table 3

List of mandatory bachelor's core humanities disciplines for technical specialties
(on the example of UrFU)

Discipline	Laboriousness (credit units)	Code and name of UC
Effective communication practices	3 c.u.	UC-1. Able to search, critically analyze and synthesize information, apply a system approach to solving assigned tasks; UC-2. Able to determine the range of tasks within the set goal and choose the optimal ways to solve them, based on current legal norms, available resources, and restrictions; UC-3. Able to carry out social interaction and realize his role in the team; UC-4. Able to conduct business communication in oral and written forms in the state language of the Russian Federation and foreign language(s); UC-6. Able to manage their time, build and implement a trajectory of self-development based on the principles of education throughout life
Foreign language	8 c.u.	UC-4. Able to conduct business communication in oral and written forms in the state language of the Russian Federation and foreign language(s)
Basics of project activity	3 c.u.	UC-2. Able to determine the range of tasks within the set goal and choose the optimal ways to solve them, based on current legal norms, available resources, and restrictions; UC-3. Able to carry out social interaction and realize his role in the team; UC-6. Able to manage their time, build and implement a trajectory of self-development based on the principles of education throughout life
Philosophy	3 c.u.	UC-5. Able to perceive the intercultural diversity of society in socio-historical, ethical, and philosophical contexts
History	3 c.u.	UC-5. Able to perceive the intercultural diversity of society in socio-historical, ethical, and philosophical contexts

It is important to note that the university has created a Center for the development of universal competencies – a platform for the formation of universal competencies among students, which is extremely important for students of technical specialties. The Center for the development of universal competencies offers students the choice of minors, which each student needs to master (mastering is possible through distance technologies). In the 2019–2020 academic year, 7 minors were more popular among students, proposed by the Center for the development of universal competencies: "Personal Efficiency", "Personal Style", "Phone Photos Like a Pro", "Soft Skills from Rosatom", "Negotiations", "Art of public speaking", "Personality psychoanalysis". The Center for the development of universal competencies implements active training technologies: negotiation fights, TED and Stand up presentations, trainings, and master classes from experts. In the 2020–2021 academic year, students are offered online courses from three educational service providers-MSU (14), ITMO (3), UrFU (11) and online courses from nine providers – ITMO (7), MSU (2), MEPhI (2), HSE (17), Polytech (7), SPBU (3), TSU (3), UTMN (1), UrFU (44). Thus, for the mastering of the humanitarian culture and the formation of universal competencies among students of technical specialties, the university provides a wide range of opportunities to choose the disciplines of the humanities block [22].

Another form of implementation of the strategy for the humanitarization of technical education, identified by us, is defined as a spontaneous practice, implemented to a greater extent in extracurricular activities through the development of public, scientific, and creative associations. Thus, the joint council of UrFU students includes 27 organizations, the key ones are the Union of students (> 16 000 students), Ural volunteers (> 5 000), Student Squad Headquarters (> 3 000), Creativity Center (> 1 000), the association of mentors has 374 volunteers [23]. Each institute in the university's structure forms the composition of the Students Union, its own team. As a result, students master the practice of designing,

planning and organizing events, conducting negotiations, building communications, and thinking through a business plan. Therefore, students of technical specialties, members of the Students Union, have the opportunity to master the humanitarian culture in activities, in the process of implementing the Union's projects. All the others are participants of events, subscribers of the group in Vkontakte (as of May 2020, the number of subscribers was > 24 000 people), follow news releases in corporate publications [24]. Through the joint efforts of students, mentors, and curators, Career night, Test drive, Foreign language club, RAZOOM educational project, and other events were organized and held in the 2019–2020 academic year (674 events in total).

In addition to student initiatives, it is important to pay attention to the Council of Young Scientists of the university, which for students interested in research activities, implements a series of events to form a number of competencies necessary for writing scientific articles, preparing speeches at conferences and other scientific events, for participation in international educational and grant projects. In addition, students are involved in the implementation of departments' grants and projects and other scientific divisions of the university.

Draw your attention to the fact that many researchers are concerned about the problem of forming a humanitarian orientation of the personality of university technical specialties' students. So, O. V. Lazarak conducted a survey of technical specialties' students: 92% of respondents do not realize the importance of studying humanities, considering that a lot of time is devoted to the subjects of the humanitarian cycle, and a narrow specialization is in demand in the modern labor market, therefore, the main attention should be paid to exact and specialized disciplines [25]. All this testifies to the lack of formation of humanitarian culture among students of universities, not understanding the importance of universal competencies recognized in the world as necessary ways of successful professional activity.

Conducted research confirms the need to intensify the university's activities in the context of humanitarization of technical education, the inclusion of humanities in the educational / extracurricular process as the most important condition for the formation of a humanitarian culture.

Conclusions

In the process of mastering student training programs, the task of forming socially mobile, adaptive, striving for professional improvement graduates arises. In this connection, the question of forming the ability to think critically, self-presentation skills, argumentation, soft skills, especially for students of technical specialties, is acute.

Humanitarization of university technical education is defined by us as the process of creating and implementing conditions for the mastering humanitarian disciplines, the formation of a system of student organizations in order to develop students' humanitarian culture. In academic, extracurricular, scientific activities, and project-based learning, the key issue is the creation of a motivational space at the university in order to include students in the educational process. The study showed that to ensure the effectiveness of the processes of technical education's humanitarization, it is important to support the development of a set of strategic forms of "purposeful efforts" and "spontaneous practice".

We think that the problem of forming universal competencies among students of technical specialties, which we consider as necessary to ensure the success of their

professional activities, remains relevant. It can be concluded that the humanitarization of technical education involves the creation of an educational developing environment, a specially organized motivational space in order to form competencies necessary for students to effectively position themselves in society. This system of organization of the educational process will ensure the training of specialists who are ready for continuous personal and professional self-development, which is particularly important in the modern socio-cultural situation.

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